



Pioneer in Green Roof Technology

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Specification - Xero Flor® XF301 Pre-cultivated Green Roof System Standard Build Up on Protected Membrane Roofing Assembly (PMRA)

PART 1 GENERAL

1.1 Summary

This document is to be included as a separate section in **DIVISION** _____. It is intended as a guideline for materials function and assembly instruction. The specific project design is subjected to modification as needed for each specific project, such as increasing the water retention capability of the system as permitted by the structural load bearing capacity.

1.2 Definitions

- A. Root Barrier: Root Barrier: A water impermeable, flexible layer below the green roof system that serves as protection against root encroachment into the underlying roof components.
- B. Water Retention Fleece: A non-woven fabric material that retains water and nutrients for plant use and increases water retention capacity of the green roof system. It forms part of the pre-cultivated vegetation mat.
- C. Pre-cultivated Vegetation Mat: A thin combination of plant material, growing medium and synthetic fabric carrier. Pre-cultivated mats are harvested from the field fully vegetated and delivered to the installation site as sheets or rolls.
- D. Growing Medium: A low-organic/high-mineral composition growing mix composed of porous aggregate, sand and compost.
- E. Ballast: Washed river stones with diameter between 16 and 32 mm (0.6" and 1.2").

1.3 Related Sections

- _____ - _____
- _____ - _____
- _____ - _____
- _____ - _____
- _____ - _____

1.4 Description

Deliver and install a Xero Flor® XF301 Pre-cultivated Vegetation Green Roof System on a low-slope, protected membrane roofing assembly (i.e. inverted roof).

1.5 Submittals

The manufacturer shall provide a drawing of the cross section of the green roof system to the architect / builder / installer detailing the components comprising the Xero Flor® system

1.6 Quality Assurance

All Xero Flor® green roof systems meet the FLL Guidelines for the Planning, Execution and Upkeep of Green-roof Sites and are installed by certified contractors with demonstrated experience and project references.

1.7 Delivery, Storage, and Handling of Material

- A. Pre-cultivated plant material shall be delivered in such a manner as to preserve the quality of the plants. Truck delivery will be conducted in a manner to protect the vegetation mats from temperature or wind damage. For transport times less than 1 day, a closed or open trailer may be used. For longer duration transport times, vegetation mats shall be delivered in a climate controlled trailer (e.g. refrigerated container). Upon arrival, the mats shall be immediately off-loaded, plastic wrap removed (if used), and installed within 12 hours. If timely installation is not achievable, a holding area shall be reserved to unroll and store the mats until transport to the roof and installed.
- B. Non-living component such as water retention fleece shall be kept dry and protected from the elements (e.g. cover with a water-resistant tarp) and freezing while storing on site.

1.8 Vegetative Coverage Guarantee

The vegetation shall be sufficiently pre-established to provide a minimum of 70% vegetation coverage at the time of installation and minimum of 90% coverage after the second full growing season.

PART 2 PRODUCTS

2.1 XF112 Root Barrier

A low density polyethylene sheet to be installed on top of the roof membrane and below the other green roof components. It is certified to protect the roof membrane against root penetration.

2.2 XF159 Water Retention Fleece

A fabric produced from a blend of 100% recycled polymeric fibre, mechanically bonded without any chemical or thermal treatment. Thickness: 10 mm (0.4"). Water-saturated weight: 10.3 kg/m² (2.1 lb/ft²). Water storage capacity: 9.1 l/m² (0.03 ft³/ft²).

2.3 XF301 Pre-cultivated Vegetation Mat

A flexible vegetation carrier consisted of a lightweight water retention fleece sewn to a three-dimensional flexible matting of looped polymeric filaments thermally bonded to a perforated nonwoven geotextile filter fabric. The three-dimensional polymer matting is filled with a XF200 Xero Terr[®] growing medium and pre-cultivated with an even layer of low-profile, drought-tolerant vegetation. Thickness: 30 mm (1.2"). Water-saturated weight: approximately 37.0 kg/m² (7.5 lb/ft²). Water storage capacity: 17.3 l/m² (0.06 ft³/ft²).

2.4 XF200 Xero Terr[®] Growing Medium (integral with XF301 Pre-cultivated Vegetation Mat)

A proprietary mixture of lightweight mineral based materials and organic matter specially engineered for green roof planting. It meets the requirements for growing medium in the FLL Guidelines for the Planning, Execution and Upkeep of Green-roof Sites. Water-saturated density: approximately 1880 kg/m³ (3162 lb/yd³). Water storage capacity: 3.8 l/m²·cm (0.03 ft³/ft²·in.). It is part of the XF301 pre-cultivated vegetation mat.

2.5 Irrigation System (if necessary)

An outlet or other means of supplying water to the roof with sufficient pressure is required. Irrigation shall be applied during the first 2 weeks after installation depending on the climatic conditions. Periodic irrigation is recommended during the hottest months of the establishment period (e.g. first and possibly second growing seasons after installation) until the roots have grown into the water retention fleece. Irrigation is also

recommended during extreme drought. The method of supplying irrigation may vary with regard to removable or permanent piping, rotary heads or drip irrigation, or other irrigation technologies, as well as the irrigation schedule, and are to be determined by the architect, contractor, facility manager and/or the manufacturer.

PART 3 EXECUTION

3.1 General

All green roof system components, including irrigation if specified, are to be installed by certified contractors with demonstrated experience and project references. The various layers shall be installed in such manner as not to damage or disturb any previously installed roofing components. Installing the system in any manner inconsistent with manufacturer guidelines voids all guarantees and warranties. Contact a Xero Flor[®] Canada representative for guidance if needed.

3.2 Inspection

- A. Underlying roof components (deck, vapour barrier, insulation, waterproofing membrane, etc.) shall be installed and tested according to manufacturer guidelines. The surface of the roof shall be swept free of debris prior to installing the green roof system.
- B. The roof structure must be certified by the structural engineer to have sufficient load bearing capacity to support the water saturated weight of the green roof at 58.07 kg/m² (11.73 lb/ft²).
- C. The roofing system must be tested for continuity (e.g. flood test or EFVM test) and certified to be watertight prior to the green roof installation.

3.3 Root Barrier (Installed by Roofing Contractor)

The root barrier is loose-laid and shall be installed with a minimum of 30 cm (12") overlap. The ends of root barrier rolls also need to be overlapped. Staggering of adjacent rolls to avoid creating a seam perpendicular to the length of the roll is optional. The root barrier rolls shall be installed working out from the drains. Each subsequent roll shall overlap the previous roll by 30 cm (12") in shingle fashion to facilitate water flow towards the drains and minimize water seepage between the rolls.

3.4 Insulation (to be supplied and installed by Roofing Contractor)

3.5 Filter Fabric (to be supplied and installed by Roofing Contractor)

3.6 Stone Ballast (to be supplied and installed by Roofing Contractor)

3.7 Water Retention Fleece

Install two layers of water retention fleece on ballast with a 5 cm (2") overlap with either side facing up. Cut to fit along the roof edge and around penetrations. Stagger the top layer over the bottom layer to avoid alignment of seams above each other.

3.8 Pre-cultivated Vegetation Mat

- A. Immediately prior to installation of the vegetation mat on the water retention fleece, all base component layers must be thoroughly saturated with water. Failure to saturate green roof system base layers will result in severe stress to the root system and harm to the vegetation mat.
- B. Pre-cultivated vegetation mats are supplied to the site either in rolls or in flat sheets and with a minimum of 70% vegetation coverage. Vegetated mats are cultivated using plant seeds and stem cutting of a mixture of succulent species. The relative proportion, final makeup, and appearance of individual species will vary among individual mats within a shipment and after plant community development in a roof installation.
- C. Each vegetation mat section has a lightweight fleece affixed to the mat underside, which is offset by approximately 10 cm (4") creating an exposed strip to be overlapped by the adjacent vegetation mat. Each row of adjacent vegetation mats should be offset by half the length of an individual mat to avoid alignment of end seams across rows.
- D. Upon complete installation of the mats, it may be necessary to redistribute and/or supplement the substrate to ensure even coverage across the carrier mat. In areas or along edges where substrate was lost during transport and handling, new substrate must be added to support vegetative coverage.
- E. Water the green roof immediately and thoroughly after installation to assist with settling of individual components and to support recovery and establishment of the vegetation.

3.9 Irrigation System (if necessary)

The installation of the irrigation system shall be carried out by a contractor with not less than two years experience in irrigation system installation.

3.10 Roof Edges, Drains, and Other Penetrations

- A. Keep a border of 50 cm (20") in width clear of vegetation between vegetated area and the roof edge, as well as the roof penetrations, such drains and vents.

- B. Install all green roof system components (i.e., water retention fleece and the pre-cultivated vegetation mat) up to the edge of the non-vegetated border.
- C. Install concrete pavers in the non-vegetated border around the parapet, flushed to the vegetated area. This can be achieved by raising the concrete pavers by additional ballast or adjustable pedestals.
- D. Fill the non-vegetated borders around penetrations with round washed river stones with diameter between 16 and 32 mm (0.6" and 1.2"). Flush with vegetated area.

3.11 Repair

The green roof system must not be adhered or otherwise affixed to the constructed roof in any manner, thereby allowing access for roof repairs or modifications by rolling back or removing the vegetation system components.

